TECHNICAL REVIEW DOCUMENT for OPERATING PERMIT 950PMR010

to be issued to:

Colorado Interstate Gas Company Fort Morgan Compressor Station Morgan County Source ID 0870003

Prepared on January 23, 1996 David H. Webb, Review Engineer

Revised January 28, 1997

I. Purpose:

This document establishes the basis for decisions made regarding the Applicable Requirements, Emission Factors, Monitoring Plan and Compliance Status of Emission Units covered within the Operating Permit proposed for this site. It is designed for reference during review of the proposed permit by the EPA, the Public and other interested parties. The conclusions made in this report are based on 1) information provided in the original application submittal of January 1, 1995 and supplemental technical submittals of January 17, March 23, June 22, 1995, and January 27, 1997; 2) negotiations conducted to resolve disputed permit terms during the Public Comment/Hearing period; 3) numerous phone contacts with the applicant.

II. Source Description:

This source is classified as a natural gas processing facility defined under Standard Industrial Classification 1321. Gas is compressed to specification for injection to a field reservoir using five (5) internal combustion engines to power compressor units. Two (2) additional engines on site are utilized in the refrigeration of propane used in heat exchange to extract natural gas liquids from the gas during recovery from the field reservoir. Other activities conducted on site include dehydration of the gas through contact with ethylene glycol, and gravity separation of condensates.

The facility is located near the Town of Fort Morgan, CO in an area designated as attainment for all criteria pollutants. The source emits greater than 250 tons per year of Nitrogen Oxides and Carbon Monoxide. Future modifications at the facility which trigger Prevention of Significant Deterioration (PSD) significance levels as defined in Colorado Regulation 3, Part A, Section I.B.58 will require analysis of Best Available Control Technology (BACT) for the Unit(s) in question. Facility wide emissions are as follows:

VOC	83	32
CO	417	64
HAPs	18	Negligible

Potential emissions are as calculated in the Title V application, supplemented by revised worst case emissions for the dehydration units submitted January 27, 1997. Actual emissions are based on 1994 data submitted by CIG to demonstrate compliance with existing permit terms. For the engines, facility fuel use was apportioned to each unit based on hours of operation and engine size. Cubic feet per engine was then used in the following equation to determine emissions:

Actual VOC emissions from the dehydration units were calculated by using a ratio of the gas processed in 1994 to maximum design rate.

Fugitive emissions were assumed to be equal to PTE, lacking any measured data to show otherwise.

III. Emission Sources:

The following sources are specifically regulated under terms and conditions of the Operating Permit for this Site:

<u>Units E001, E002</u>- White Superior Model 6G-825 4 Cycle Internal Combustion Engines, Manufacturer's Rated 600 HP, Serial No. 20792. Natural Gas Fired.

<u>Units E003, E004</u> - White Superior Model 8GT-825 4 Cycle Internal Combustion Engines, Site Rated 925-993 HP, Serial Nos. 18684, 20003. Natural Gas Fired.

Discussion:

- 1. Applicable Requirements- All of these units began operation in either 1966 or 1973. Prior to June of 1983, Colorado Regulation No. 3, Section III.D.c.ii exempted engines less than 1000 HP from state permitting requirements. As noted above, all of these engines meet this exemption criteria. The engine installed in 1966, E003, is grandfathered from permitting requirements since installation occurred prior to February 1, 1972. Consequently, the only applicable requirements for these engines are a 20% Opacity limitation and Air Pollution Emission Notice (APEN) Reporting in accordance with Colorado Regulation 3, Part A.II.
- **2. Emission Factors-** Emissions from these reciprocating engines are produced during the combustion process, and are dependent upon the air to fuel ratio adjustment, engine design specifications, and specific properties of the natural gas being burned. The pollutants of concern are Nitrogen Oxides (NOX), Carbon Monoxide (CO) and Volatile Organic Compounds

(VOC). Small quantities of Hazardous Air Pollutants (HAPs) are also emitted when combustion is incomplete. Approval of emission factors for these engines are necessary to the extent that accurate actual emissions are required to verify the need to submit Revised APENs to update the Division Emission Inventory. Colorado Interstate Gas has proposed the use of AP-42 factors for 4-Cycle, Rich-Burn engines from Table 3.2-2 (7/93) as follows:

Pollutant Pollutant	Emission Factor	
NOX	10.0 grams/bhp-hr	
CO	8.60 "	
VOC	0.14 "	

3. Monitoring Plan- Colorado Interstate Gas has proposed to calculate emissions for fee purposes using these AP-42 factors multiplied by maximum site-rated horsepower and recorded hours of operation. They will be required to conduct the emission calculation annually and submit a Revised APEN to the Division if emissions increase by more than 50 tons/year or 5%, whichever is less, compared to the latest APEN on file with the Division. This plan is consistent with the Monitoring Grid for Internal Combustion Engines developed by the Division (attached). Note that hours of operation must be determined monthly rather than annually since an individual engine fuel use allocation is dependent upon run time hours of each engine on site.

The Division has determined, based on AP-42 emission factors and engineering judgement, that particulate emissions from these engines will be insignificant if natural gas is used exclusively as fuel. Use of natural gas will be the compliance demonstration method for the Opacity standard.

4. Compliance Status- Colorado Interstate Gas has submitted updated APENs reporting actual 1994 emissions of criteria pollutants based on AP-42 factors and Hazardous Air Pollutants based on the EPA SPECIATE database. CIG certified within the application that natural gas has been used exclusively as the fuel for these engines.

<u>Unit E005</u> - White Superior Model 8GT-825 4 Cycle Internal Combustion Engine, Site Rated 1015 HP, Serial No. 20624. Natural Gas Fired.

Discussion:

- 1. Applicable Requirements- This Engine was permitted by the Division in August of 1973 under Permit P10,302. The permit lists only the equipment description with no pollutant or fuel use limitations. It was renewed indefinitely in August, 1975. Since no specific terms or conditions exist, Applicable Requirements for this engine are the 20% Opacity limitation and APEN Reporting in accordance with Regulation 3, Part A.II.
- **2. Emission Factors-** Emission Factors for this engine are the same as for engines E001-E004. Refer to previous emission factor discussion.

- **3. Monitoring Plan-** Since no emission or fuel use limitations exist for this engine, acceptable monitoring will be as described for Engine Units E001-E004. This engine has been grouped with Units E003 and E004 in the Operating Permit for this reason
- 4. Compliance Status- Although this engine was installed in 1973, prior to the rescission of the 1000 HP exemption described previously, site rated horsepower is 1015. Accordingly, Colorado Interstate Gas applied for and received Construction Permit P10,302 as required by Colorado Regulation No. 3. Based on information submitted in the application, this unit has not been modified since original installation. Therefore, Permit P10,302 remains in effect. Colorado Interstate Gas has submitted an updated APEN reporting actual 1994 emissions of criteria pollutants based on AP-42 factors and Hazardous Air Pollutants based on the EPA SPECIATE database. CIG certified within the application that natural gas has been used exclusively as the fuel for these engines.

<u>Units E006, E007</u>- Superior 8GTLB 4 Cycle, Lean Burn Internal Combustion Engines, Manufacturer's Rated 1100HP, w/ Low NOX Design, Serial Nos. 322919 and 322929. Natural Gas Fired.

Discussion:

1. Applicable Requirements- These engines were installed and began operation in 1993. A State of Colorado Initial Approval Construction Permit was issued on June 18, 1993 (93MR297). A performance test required under Condition 7 of that permit was conducted in August of 1994. This test verified that emission factors used in the original permit application were acceptable. The following terms and conditions of Construction Permit 93MR297 have been incorporated into the Operating Permit as Applicable Requirements: Annual emission limits for NOX, CO and VOC; Annual Fuel Use limit; Engine Hours of Operation limit; 20% Opacity limit. Short term fuel use and emissions limitations have been revised based on the attached Stipulated Agreement negotiated as part of a CIG appeal of the Draft Operating Permit for this source (See discussion on Conditions 3.1 and 3.2).

Facility potential emissions prior to the installation of these engines exceeded 250 tons/year for Nitrogen Oxides. Therefore, CIG installed a low-NOX, clean burn design to avoid a significant increase per Prevention of Significant Deterioration regulations. PSD consequently did not apply to this facility expansion.

2. Emission Factors- Manufacturer's data was submitted as part of the Title V application in support of the gram/hp-hr emission factors (EFs) used in the Initial Approval permit. Stack testing was conducted in August of 1994 to verify these factors:

Pollutant NOX Emission Factor 2.0 grams/hp-hr

CO 3.0 grams/hp-hr VOC 0.8 grams/hp-hr

The lb/MMBTU factors listed for compliance purposes in the Operating Permit were obtained as follows:

Lb/MMBTU = (g/hp-hr factor) X (10E6 BTU/MMBTU) (Design Heat Rate of Engine)(453.6 g/lb)

Where- Design Heat Rate = 7090 BTU/hp-hr

3. Monitoring Plan- The methods of verifying compliance with the stated applicable requirements as listed under Conditions 3.1 to 3.7 of the Operating Permit are consistent with the Monitoring Grid for Internal Combustion Engines developed by the Division (attached). The Grid calls for portable monitoring on a quarterly basis for engines with listed emission factors below AP-42 levels as a regular method to ensure that the factors are representative of continued operation. Portable Monitoring results will also be used to determine compliance with the hourly emission limitations listed under Condition 3.1 of the Permit for NO_X and CO. The compliance emission factors will be converted to fuel based factors for determination of emission levels. This is consistent with the method CIG utilized in the Operating Permit application to demonstrate compliance with existing permit conditions. A one time stack test will not be required since August 1994 results indicated compliance with permit terms of Initial Approval Permit 93MR297.

The required frequency (annual) of BTU analysis of the fuel used to fire these engines was changed from semi-annually in the Draft based on data submitted by CIG indicating consistent BTU. The Division agreed that an annual analysis would be adequate to define the BTU content for purposes of calculating emissions.

4. Compliance Status- Colorado Interstate Gas verified compliance with the emissions, fuel and hours of operation limitations of the Initial Approval permit in supplemental information to the Operating Permit application. 1994 actual values for all parameters were well below permit limitations. The stack test required under Condition No. 7 of the IA has been conducted, verifying emission rates. These engines are therefore currently in compliance with all applicable requirements.

<u>Units D001 and D002</u>- Sauder Tank and Procex Packages 400 MMSCFD Glycol Dehydration Units.

Discussion:

1. Applicable Requirements- These Units were installed and began operation at the site in 1973 and 1979 respectively. At that time, the Division did not regulate Volatile Organic Compound emissions from these units.

Subsequently, only the heater portion of the dehydrators were initially evaluated. Since that time, data has been compiled showing that VOC and HAP emissions may be significant from the still vent portion of these units.

A request for documentation as to the specific installation date for the Sauder Tank dehydrator was requested since this point was originally considered grandfathered in the Division inventory. In response, CIG submitted a permit application for this point. Colorado Construction permits 94MR776 and 12MR477 (Initial Approvals) were issued limiting Volatile Organic Compound emissions and gas processing for these units. The Draft Operating Permit incorporated short and long term VOC emission limits and processing limits from these permits. As part of the attached Stipulated Agreement between the parties, the VOC emission limit was converted from hourly to monthly (See discussion on Condition 4.1).

A future MACT standard is being developed for operations at Oil and Gas facilities which likely will apply to emissions from glycol dehydration units. Until such time as this rule is promulgated, no control requirements exist for these points.

- 2. Emission Factors- Ethylene glycol is injected into the natural gas stream to remove moisture so as to prevent freezing. A glycol/water mixture is dropped out of the gas in a cold separator. This mixture is further processed through a flash tank and then heated in the still vent portion of the dehydration unit which drives off the water and some entrained VOCs. Emissions from this process are typically predicted using the Gas Research Institute's GLYCalc Model. Emission factors of VOCs and various HAPs are dependent upon the variables input into this Model. These variables include glycol recirculation rate, cold separator temperature and pressure, and percentage breakdown by volume of constituents in the natural gas. CIG submitted a revised GLYCalc run assuming worst-case values for these parameters on January 27, 1997.
- **3. Monitoring Plan-** CIG will use the GRI GLYCalc Version 3.0 Model or higher, as necessary, to predict emissions of VOC and HAPs from the still vents of these dehydration units to determine compliance with VOC emission limitations. Daily recording of system parameters (cold separator temperature and pressure) and semi-annual gas analysis will be conducted as outlined in Condition 4.1 of the Operating to compare to established worst-case parameter values. This plan is consistent with the Stipulated Agreement reached between the Division and CIG following appeal of the Draft Permit.
- **4. Compliance Status-** CIG has submitted APENs for these two dehydrators in accordance with the Division policy of October, 1994 in which VOC and HAP emission data was requested. Appropriate Construction permits have been generated as a result. Therefore, these units are currently in compliance with all Applicable Requirements.

<u>Unit F001</u> - Fugitive Emissions of VOC from Equipment Leaks

Discussion:

- 1. Applicable Requirements- Emissions as submitted in CIG's permit application exceed the 5 ton per year permitting threshold for Volatile Organic Compounds in ozone attainment areas as defined by Colorado Regulation No. 3. Fugitive emissions at compressor stations have traditionally not been permitted unless requirements of New Source Performance Standard (NSPS) Subpart KKK apply. In this case, the plant began operation in 1966, with expansions in 1973 and 1993. The Division has interpreted that NSPS KKK will not apply to sources which substantially began operation prior to the effective date of this NSPS. However, as part of the Title V process, equipment leak estimates at these sources will be included in the Operating Permit if the state permitting thresholds are exceeded. Therefore, the limit established by potential VOC emission calculations in the application have been incorporated into the Operating Permit as an Applicable Requirement.
- **2. Emission Factors-** The calculated VOC emissions in the Draft Operating Permit are based on leak emission factors from EPA's Protocol for Equipment Leak Estimates, Table 2-6.
- **3. Monitoring Plan-** CIG will be required to conduct a semi-annual inventory of valves, seals, etc. in order to verify levels of emissions based on the EPA Protocol. They must also document steps taken to repair or mitigate leaks discovered during the reporting period (See Condition 5.2 of Draft Operating Permit).
- **4. Compliance Status** CIG accurately quantified emissions of VOC from Equipment Leaks and submitted a representative APEN in the Operating Permit application. They are therefore currently in compliance with state requirements.

IV. Insignificant Activities

Emissions from Purging/Venting during Start-up or Shut-Down

In response to the January 25, 1995 technical request, CIG responded that all gas releases during start-up, shut-down or planned routine/periodic maintenance are sent to a flare for combustion. Combustion of gas is approximately 312,000 cubic feet per month which produces negligible emissions of criteria pollutants.

Well Head Heater Separators

These units were previously permitted by the Division under Permits C-13,277-1 to 10. Design capacity of each of these heaters is 1.5 MMBTU/hr.

Under Colorado Regulation No. 3, Part C, Section II.E.3.k, gaseous fuel burning equipment with a design heat rate of less than 5 MMBTU/hr can be considered as an insignificant activity for the Operating Permit. CIG requested cancellation of these permits in the original application submittal of January 1, 1995. Therefore, these units will not be regulated in the Operating Permit, and are listed in Appendix A as insignificant activities.

V. Alternative Operating Scenarios

Temporary Engine Replacement-

CIG has indicated that replacement engines are typically not used during major engine overhaul. They are aware that any temporary or permanent replacement of engines at this site shall not be conducted without prior notification to the Division. The Division will determine whether the proposed change at the site will require a Construction Permit and/or modification of the Operating Permit. Installation of equipment not specifically identified in the Permit prior to notification to the Division shall be considered a violation subject to enforcement action.

VI. Permit Shield

The regulation citations identified as not applicable to this source in Section III of the Operating Permit are based on a condensed version of the requested Permit Shield citations as submitted with the original application for this plant. The original list contained many citations that were clearly unnecessary for the shield. For example, CIG stated that Incinerator regulations would not apply since no equipment on site met the definition of an incinerator. It is the Division's opinion that the Shield should be reserved for regulations that might reasonably otherwise apply to equipment at the plant in question. Therefore, the Division proposes that the Permit Shield be condensed to a format similar to that submitted for CIG's second two-third sources (e.g. Vilas).